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ABSTRACT

In France, intermediate professions are jobs for holders of the professional baccalaureate plus 2-4 years of additional study. Intermediate technological education supplies a qualification that comes between secondary education and the qualified engineer. These people have a practical background that combines knowledge with skills and an ability to grasp the know-how of the firm. Between the technician who operates directly in the production process and the engineer or manager who is placed upstream of this process (creating, organizing, and forecasting), current economies need professionals on the ground at the intermediate level. The need for a middle manager or middle engineer has become obvious, one able to understand and master the production process, able to adapt, party to technological changes, and with the skill to be the interface between technician or employee and engineer or manager. There is no technological teaching apart from that immersed in the economic fabric of companies. The teacher must be master of a certain amount of knowledge and of know-how; be familiar with technological reality; be party to training that includes lessons, tutorials, and practical work; have the desire and means to form a partnership with the company; and be adaptable. This type of teaching is expensive, but the cost is lessened by increased internal output and profitability through exchange channels with firms. (YLB)

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TEND 2000

Crossroads of the New Millennium

The Needs Of Intermediate Professions: Middle Engineers And Middle Managers

Prepared and Presented

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Poster Presentation

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THE INTERMEDIATE PROFESSIONS IN FRANCE

The distinction between training and the level of training is relatively clear, though the way they correspond is much more complex in terms of employment level.

Of course, collective agreements expect a correspondence between employment and the training required. In the educational system, we can particularly note the first job level, though this aspect, in relation to agreements, is rarely applied in small and medium sized businesses or industry. More recent agreements (pharmaceutical industry) make very little reference to required knowledge.

Employment is composed of:

1. complexity
2. responsibility
3. autonomy
4. necessary knowledge
5. necessary experience

If the baccalauréat* is the knowledge reference in France, **the first job reality, for young holders of a professional baccalaureat is: employee-worker**.

For **the holders of Bac +2 to 4** (2-4 years of study following the French baccalaureat), **the first job** comes into the scale of **"intermediate professions"**. In this context, the application made by a young graduate, over and above his level of knowledge, is analysed in terms of:

- skills related to the job applied for
- ability to grasp the complexity of the job on offer
- ability to take responsibility
- aptitude for the autonomy necessary to the job

- *IUT CONSULTANTS : French organisation specialised in the development of higher technological education and training*
- *Baccalauréat : Terminal Degree in the French Secondary Schools (Lycées)*
- *IUT : University Institute of Technology (2-year courses post baccalaureat)*
- *DUT : Terminal diploma of IUT*
- *IUP : University Professional Institute (4-year courses post baccalaureat)*

THE CHALLENGES OF HIGHER TECHNOLOGICAL EDUCATION AT THE INTERMEDIATE LEVEL

When it is a question of higher technological education, we do **not only think in terms of engineers or PhDs**. Whether it be in developed or in emerging economies, intermediate technological education is developing everywhere, i.e. supplying a **qualification which comes between secondary education and the qualified engineer**.

Coming from the French IUTs and STSs, and soon from the professional Bachelor*, from former British Polytechnics, now universities, and from German Fachhochschulen, or the Belgian civil engineering schools, are real people with a practical background, **which combines knowledge with skills and an ability to grasp the know-how of the firm**. They form the skill nucleus for the firm.

WHAT NEEDS DOES THIS SYSTEM RESPOND TO?

Between the technician who operates directly in the production process, either of goods or of services, and the engineer or manager who is placed upstream of this process (creating, organising and forecasting), current economies **need "professionals on the ground" at intermediate level**.

- This function has for a long time been the **job of the foreman**, someone who has worked his way up from the ranks through experience, a guardian of the firm's know-how. However, his "academic" training, usually rather basic, **today limits his possibilities** to adapt to the rapid technical and relational developments with the firm.
- Little by little, the **need for a "middle manager"** and a "**middle engineer**" has become obvious, one capable of understanding and mastering the production process**, able to adapt, party to technological changes** and having the skill to be the interface between technician or employee on the one hand, and engineer or manager on the other, in both directions.
- The needs of modern economies have known rapid, diverse and multiple developments; this has led to a discrepancy towards top qualifications at all levels: nowadays**, the worker must have skills and knowledge way beyond that formerly required of him**.

HOW DO WE DISTINGUISH HIGHER TECHNOLOGICAL EDUCATION STREAMS AT INTERMEDIATE LEVEL?

We must refer to the **target aimed** at: **respond to economic requirements as professionals at intermediate level**, between that of the technician and that of the engineer.

Professional profiles are varied and constantly evolving but are based on **mastery of current technologies**, which are rapidly changing, and on **an aptitude for human relations**. There are not only technical changes to be considered: the professional field is not isolated from the economic and social context.

Higher technological education at intermediate level must, therefore, **"stick to reality", be in touch with business**. . . and must **anticipate technological and sociological developments**. It is this context which enables the **main characteristics of such a system** to be defined.

RELEVANCE TO THE NEEDS OF THE SOCIO-PROFESSIONAL ENVIRONMENT

It is no longer merely a question of the acquisition of knowledge (the traditional role of **the** university), this must still be adaptable to their professional objective – which pre-supposes the acquisition of know-how.

- *DESS : 5- year Diploma post baccalaureat*
- *Professional Bachelor : 3-year professional diploma post baccalaureat (new diploma)*

It is, therefore, **less about knowledge and more about skills**: moreover, we are well aware that there is a gradual slide from the idea of a diploma (sum of knowledge) towards the idea of skill reference (which sanctions professional ability, the ability to do "something").
It is the employment market which, as a last resort, sanctions the type of training.

Alongside classic university teaching, which remains the depository of "knowledge" and guarantor of its mastery, particularly through research, which is fundamentally essential, a **different type of teaching must be developed**, one which is adapted to these objectives aimed Such training must be carried out in association with companies and with them, must develop a rich and varied exchange flow; the trainers themselves must develop through **contact with the company**, bringing in their skills and helping it to benefit from their technical abilities. In return, they will receive this permanent opening into the real world, which will add to the quality of their teaching.

From this point of view **there is no technological teaching other than that associated with**:

- **courses** led by both **teachers and professionals**
- **further education** negotiated with companies
- feasibility of this wherewithal

There is no technological teaching apart from that immersed in the economic fabric of companies.

TEACHING ADAPTED TO THE OBJECTIVE

The result of all this in this type of training is **that the teacher's mission is quite specific**. It has nothing to do with classic teaching. The teacher must clearly be master of a certain amount of **"knowledge"** and also of **"know-how"**: along with his higher level of knowledge, he must be **familiar with technological reality** and ready to keep up with it. In fact, there is no higher technological teaching without an important amount of **practical work**, which are, on the one hand, experience in a real-life situation and an apprenticeship and, on the other, **a methodological training**.

The teacher must be party to the strong "educational intensity" which this type of training supposes: **lessons, tutorials, practical work**. The teaching timetable is heavy if we add continuous assessment, projects, work experience, simulations…

The teacher must therefore find in the exercise of his possession, the motivation which will serve the training objectives. These are about **preparing students for the real world of work**. The teacher's tasks, therefore, must be defined in accordance with this objective and appropriately developed.

In this type of training, **the teacher must have the desire and the means to form a partnership with the company**.

The objectives of such training **associate knowledge, skills and know-how**. They require the teachers concerned to be highly **adaptable**.

The proposed challenge includes purely educational action as well as work on information "research" in the companies.

- transmission of knowledge often acquired at master level to students of an often lower level.
- Assimilation of technologies used in companies and learning how to use them.

The status of teacher of **teacher-researcher** in France is particularly suited to this type of work, **but methods of promotion and habits must be radically modified**.

What we need are men and women who are concerned with transfer and research of information, not necessarily of speculations which remain the basic terrain of university research.

From this point of view, the recent experience of **Technological Universities in Mexico** is **interesting**. The teachers there are recruited with the clearly defined mission of making direct contact with firms, even the smallest of these, and to develop a partnership with them. We get the feeling that, in some cases, this mission is just as important as the teaching.

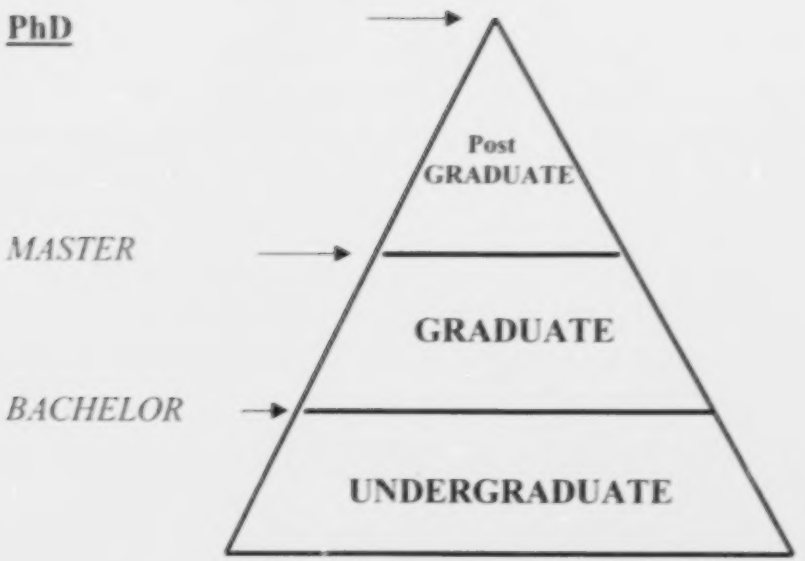
TECHNOLOGICAL PLATFORMS

We often hear it said that this type of teaching is expensive. This is true if we confine ourselves to raw data: this type of training requires numerous, varied and effective technical means: **student placement, the necessity of responding to the needs of the firm through further education and technology transfer, imposes it** (These means constitute an essential motivating factor both for the students and their teachers).

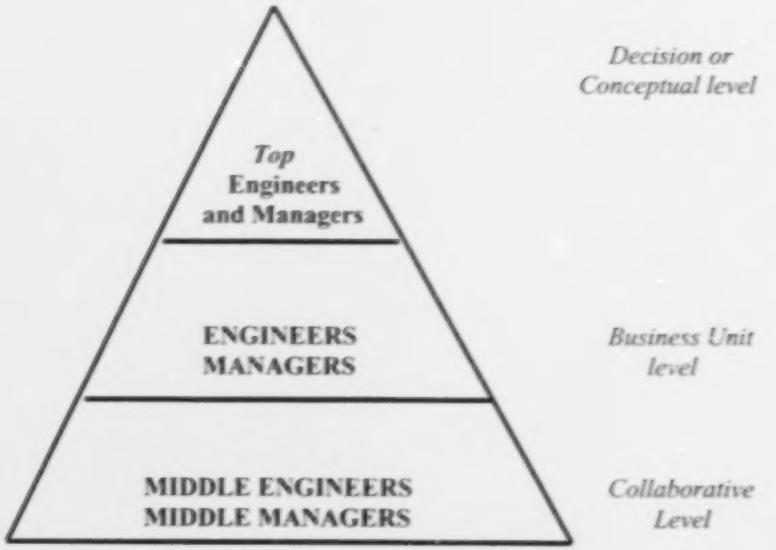
We must, however, **relativise this aspect of "cost"**, first of all, according to the increased internal output of these streams in general; and also through the profitability made possible through these exchange channels with firms.

The human and technical means essential to the satisfactory running of these channels and their correspondence to training objectives serve the beginnings of a new idea: that of platform technology, dedicated, of course, to teaching, but which is at the same time a vector essential to business openings. These platforms unite all the skills necessary to the training dedicated to one or several fields of work. In this domain, it is certain that economies in "costs" become feasible as regards equipment and writing it off, by limiting the increase in number of platforms within the fields of work, without adding to training levels.

THE UNIVERSITY LEVELS



THE ECONOMIC NEEDS IN THE FIELDS OF ENGINEERING AND MANAGEMENT



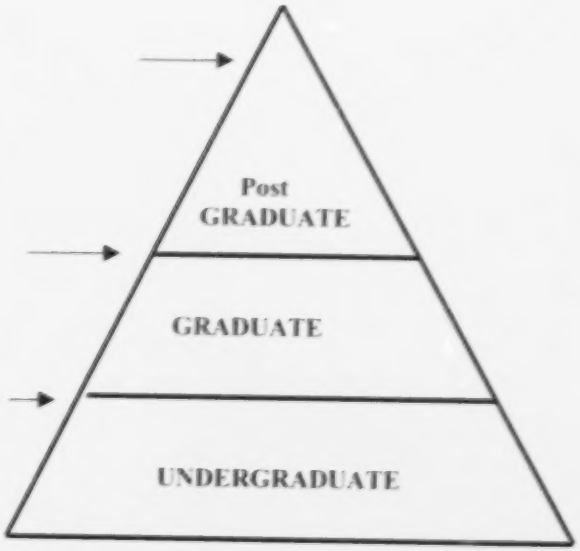
THE ENROLLMENT OF STUDENTS BY LEVEL

PHILIPPINES (1997/98)

7500
(0,5 %)

85 000
(5,3 %)

1.5 Million
(94 %)



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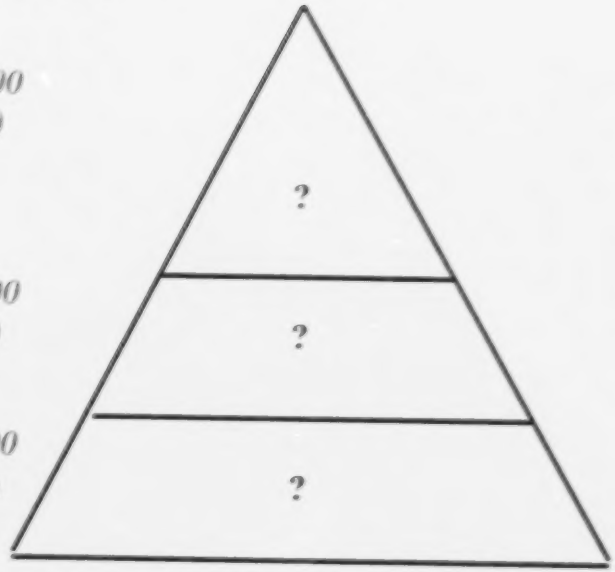
THE NEEDS OF ECONOMY BY LEVEL

FRANCE (96)

200 000
(15 %)

300 000
(23 %)

800 000
(62 %)



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